LLAGAS CREEK REACH 8
FLOOD PROTECTION PROJECT

OFFICE REPORT

Prepared By:
U.S. Army Corps of Engineers, San Francisco District
And
Santa Clara Valley Water District

FEBRUARY 2003

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WEST LITTLE LLAGAS CREEK, REACH 8
DOWNTOWN MORGAN HILL

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OFFICE REPORT
FOR LLAGAS CREEK REACH 8 FLOOD CONTROL
DOWNTOWN MORGAN HILL, SANTA CLARA COUNTY, CALIFORNIA

EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this project was to determine the most feasible option for preventing further flooding along Llagas Creek Reach 8 in Downtown Morgan Hill while considering the citizens of Morgan Hill and selecting a publicly acceptable plan. In 1982 the NRCS had proposed a U-shaped concrete channel. The residents did not agree to this plan and advised the Santa Clara Valley Water District to devise alternative plans for the urban area of Llagas Creek. The project Sponsor, the Santa Clara Valley Water District (SCVWD), was successful in requesting Congress to transfer the projects authorization to the Corps of Engineers to complete the project in a timelier manner. In 1999, the District was authorized by congress to assume completion of the Llagas Creek Flood Control Project from the Natural Resources Conservation Service (NRCS). When the unfinished reaches of Llagas Creek were assigned to the U.S. Army Corps of Engineers and the Santa Clara Valley Water District, alternative plans were devised for West Little Llagas Creek, Reach 8, Downtown Morgan Hill.

The study area is approximately 1.9 miles long and runs along many commercial and residential areas in Downtown Morgan Hill. For many years, these areas surrounding Llagas Creek have been in severe jeopardy due to flooding because of tremendous rainfall. Severe flooding would result in the loss of utilities, a rerouting of traffic, and the elimination and damage of numerous homes and businesses.

MEASURES AND ALTERNATIVES CONSIDERED

In order to halt future flooding of Llagas Creek, various protective structures were considered. All of the structures considered would provide the creek from a 100-year or 1% flood.

Vegetative Gabion Lining: Gabion baskets filled with layered rocks and soils would line the existing creek. Vegetation would be incorporated to simulate the natural channel at the same time protecting the surrounding area from future floods.

Bypass Channel: The bypass channel would be used to divert the extreme flows of a flood season. The creek would remain intact and the bypass would be constructed underneath existing roadways.

Reinforced Concrete Box Culvert: The reinforced concrete box would be a closed culvert in the existing creek. It would be covered and a bike path and other recreational activities would be the result in addition to protection of the 100-year flood.

SELECTED PLAN

The selected plan is a hybrid plan of the Vegetative Gabion Lining and Reinforced Concrete Box alternatives. The cost is $34.9 million (FY 2003 price level) .

1.0 INTRODUCTION

1.1 Authority:

The Department of Agriculture (DOA) was authorized to construct the Project in 1969 pursuant to the Watershed Protection and Flood Prevention Act, Public Law 83-566. To date, the Natural Resource Conservation Service (NRCS) has completed about half of the authorized project, however; their future construction funds are limited and they do not anticipate completion of the project until at least FY 2010. Congress, in the House Report to the 1998 Energy and Water Development Appropriations Act (HR 105-190, July 1997), urged the Corps of Engineers to develop plans and specifications for the authorized project, in anticipation of the Corps assuming the construction of the remaining project elements. The Water Resources and Development Act (WRDA) of 1999 authorized the Corps of Engineers to complete the remaining reaches of the project "substantially in accordance with the NRCS watershed plan".

1.2 Purpose and Scope:

This study was conducted by the Santa Clara Valley District and the San Francisco District, U.S. Army Corps of Engineers, to determine:

- The extent of the flood control problem in Downtown Morgan Hill
- The most feasible option for preventing further flooding and loss of businesses and homes.
- The plan will be acceptable to the citizens of the surrounding areas of the creek.

Congress has authorized the Corps of Engineers (1999) to assume the completion of the Llagas Creek Flood Control Project from the Natural Resources Conservation Service (NRCS). The NRCS (formerly the Soil Conservation Service) initiated project construction in 1973 and has, to date, completed about half of the originally authorized project. Due to an anticipated funding reduction (less that $1.0 million per fiscal year for the remainder of this project), however, the NRCS does not plan to complete this work until at least 2010. The project Sponsor, Santa Clara Valley Water District (SCVWD), was successful in requesting Congress to transfer the project's authorization to the COE in order to complete the work in a timely manner.

1.3 Project Description:

The Flood Control Project is located in Southern Santa Clara County, California, in the vicinity of the communities of Morgan Hill, San Martin and Gilroy. The Llagas Creek is a conduit to the Pajaro River and the Monterey Bay encompassing a 90 square mile watershed and includes Chesbro Reservoir a multipurpose facility for flood control and water supply. The Llagas Creek system, which includes Llagas Creek, West Little Llagas Creek and East Little Llagas Creek, is especially prone to flooding. The creek system is especially prone to flooding, having recorded floods in 1937, 1955, 1962, 1963, 1969, 1982, 1997, and in 1998. Primarily, the project consists of channel improvements and a diversion channel providing a 100-year level of protection to urban areas and between 5- to 10- year protection to agricultural areas.

The Llagas Creek Flood Control Project is separated into 14 reaches. Of these, the NRCS has completed Reaches 1, 2, 3, 9, 10, 11, 12, and 13. Preliminary designs for the remaining Reaches 4, 5, 6, 7, 8, and 14 were developed by NRCS (Watershed Work Plan, 1967), however, changes in the environmental habitat within these reaches, overall watershed use, and Federal and State law necessitates a re-evaluation of these designs in order to prepare acceptable flood control features.

1.4 Study Purpose:

A special planning effort has been made for Reach 8 (Morgan Hill) in order to develop a feasible plan that is acceptable to implement for the downtown area of Morgan Hill. During this process, public, regulatory agency, and team meetings all played a part in narrowing down alternatives to satisfy the needs for all parties.

1.5 Location of Study, Sponsor, and Congressional Districts:

The study area is located in Santa Clara County, California and is situated in the downtown area of Morgan Hill. The study area is a combination of residential and commercial. The creek runs through resident's property as well as through culverts underneath the roadways. The study area is located in an incorporated area of the City of Morgan Hill and consists of the stretch of creek approximately 1.19 miles. Reach 8 begins at Dunne Avenue and extends north to just past Wright Avenue in Morgan Hill. The site is located approximately 70 miles southeast of San Francisco, California, and is bordered on the north by Alameda and San Mateo Counties, on the west by Santa Cruz County, on the south by San Benito County, and on the east by Stanislaus County.

The sponsor for this study is the Santa Clara Valley Water District. The study lies within the jurisdiction of the following Congressional District: 16th Congressional District, Representative Zoe Lofgren.

1.6 Study Participants and Coordination:

The project sponsor is the Santa Clara Valley Water District. Close coordination has been maintained between the sponsor and the Corps since the project was taken over from the Natural Resources Conservation Services (NRCS). The National Marine Fisheries Services, the U.S. Fish and Wildlife Services, and the California Department of Fish and Game were consulted, and it was determined that there would be significant impacts to the area and mitigation would need to take place in order for approval of the project. The mitigation will take place on other reaches of Llagas Creek or another area to be specified in the future.

Comment: Was Central Coast Regional WQCB also contacted? They're the only reg agency left out of this list.

NEPA requires that environmental impacts associated with Federal projects be considered as part of the planning and design process. All projects in California are also required to comply with the provisions of the California Environmental Quality Act (CEQA). To comply with both of these statutes, a Supplemental Environmental Impact Statement / Report (SEIS/R) is in the process of preparation to ensure that this is achieved. The environmental document prepared for the original project was also a joint document, an EIS/R, and was developed in 1982. The public will be notified of the availability of draft EIS/R and comments will be solicited according to the statutory requirements will be and final EIS/R documents. Prior to the final EIS/R public comments will be invited. Public meetings are held throughout the process. Regarding Reach 8 a public meeting was held to provide information to, and to receive comments from the concerned public.

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1.7 Prior reports and existing projects

Reach 8 is just one reach out of 14 reaches of a flood damage reduction project on Llagas Creek. This specific reach is different because of the urban setting. The rest of Llagas Creek is primarily agricultural. Reaches 1, 2, 3, 9, 10, 11, 12, and 13 all have been completed by NRCS. The Corps of Engineers is responsible for completion of Reaches 4, 5, 6, 7, 8, and 14.

Santa Clara Valley Water District, West Little Llagas Creek Detention Pond Study and Flood Protection Measures, May 1997. This report was done by the sponsor, the Santa Clara Valley Water District. It recommended two alternatives, a detention pond and a bypass channel.

Environmental Impact Statement, Llagas Creek ,1992. This report was completed at the beginning of the project before construction of the reaches completed by NRCS.

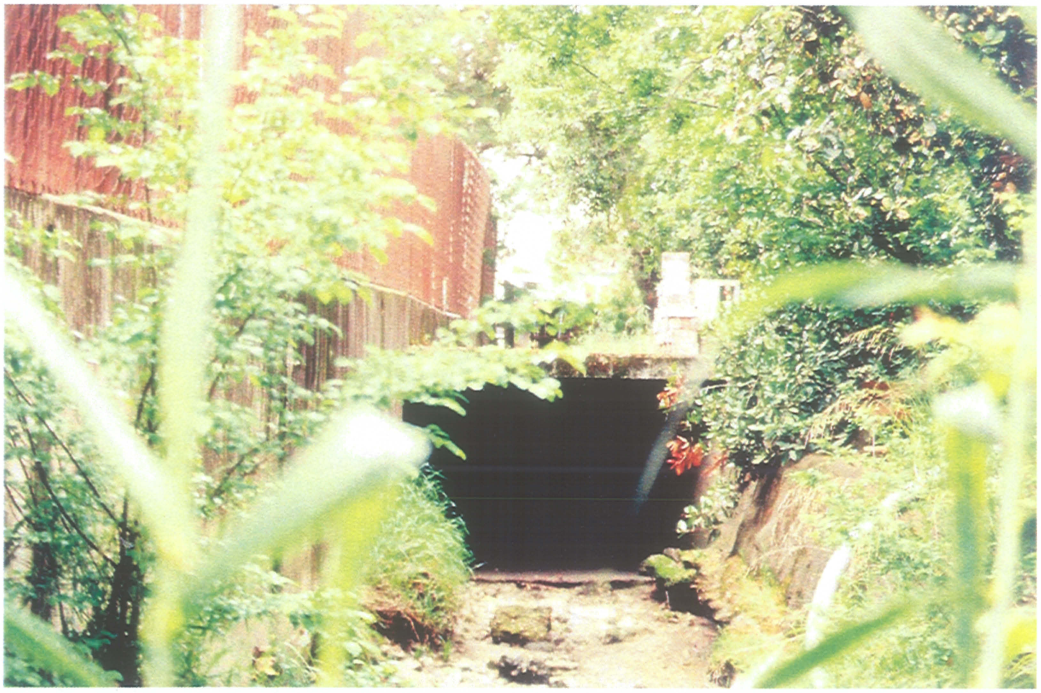
1.8 Planning Process and Report Organization. This report is divided into nine sections:

The planning process consists of six major steps: (1) Specification of water and related land resources problems and opportunities; (2) Inventory, forecast and analysis of water and related land resources conditions within the study area; (3) Formulation of alternative plans; (4) Evaluation of the effects of the alternative plans; (5) Comparison of the alternative plans; and (6) Selection of the recommended plan based upon the comparison of the alternative plans.

2.0 PROBLEM IDENTIFICATION AND NEEDS

2.1 Setting and Site Description

The study area is located in Santa Clara County, California and is situated in the downtown area of Morgan Hill. The study area is a combination of residential and commercial. The creek runs through resident's property as well as through culverts underneath the roadways. The study area is located in an incorporated area of the City of Morgan Hill and consists of the stretch of creek approximately 1.19 miles. Reach 8 begins at Dunne Avenue and extends north to just past Wright Avenue in Morgan Hill.



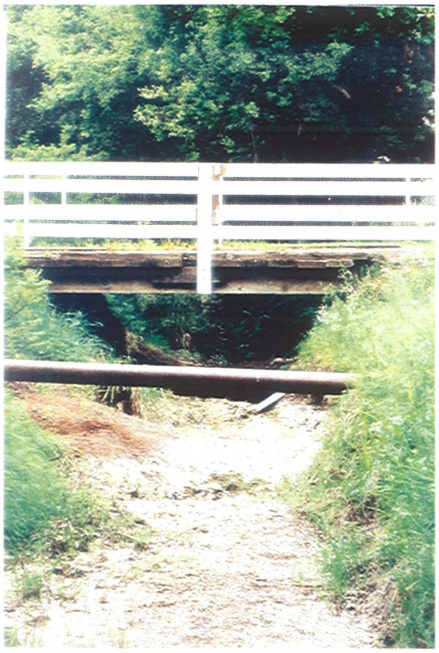


Figure 2-1– Creek at Monterey and Dunne Ave.

Figure 2-2- Bridge Crossing west of Monterey at 3rd Ave.

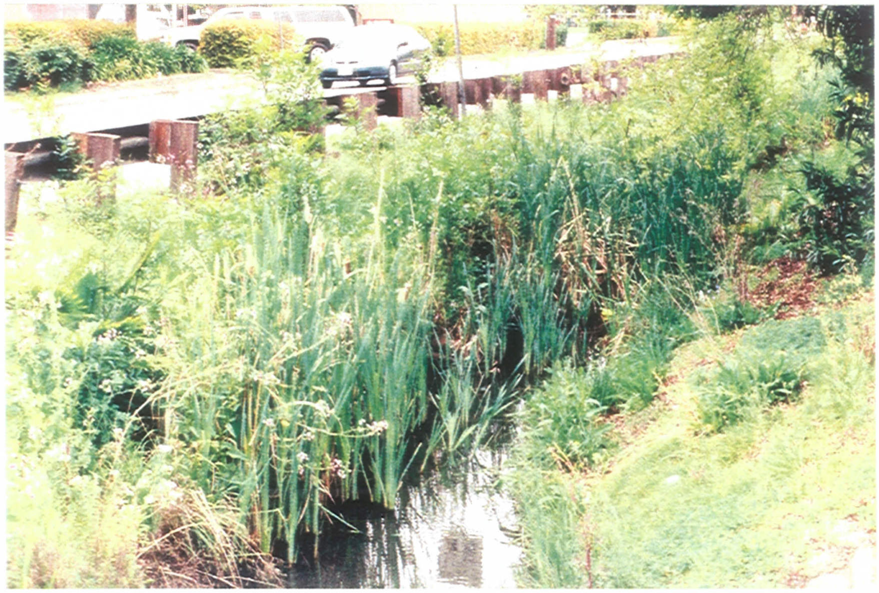


Figure 2-3 - Llagas Creek at Hale Avenue and Main

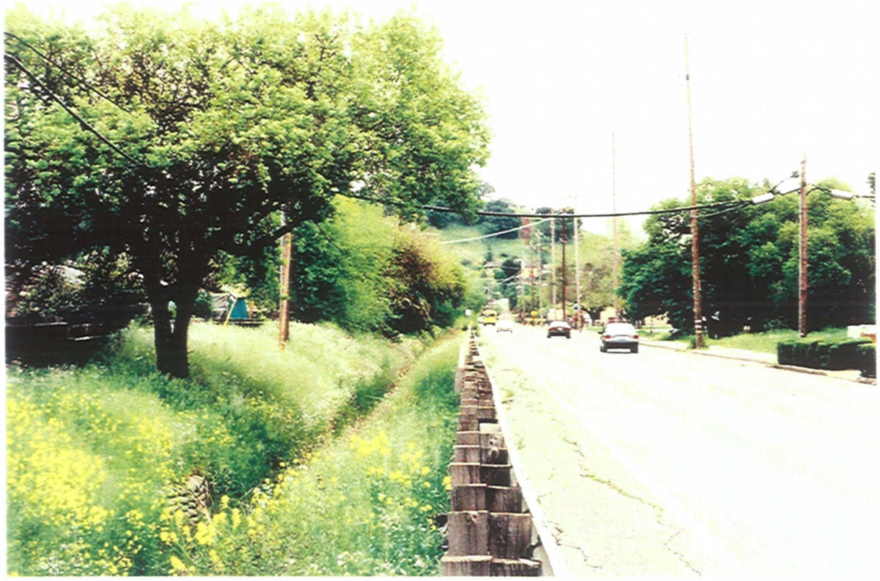


Figure 2-4 - Llagas Creek at Hale and Wright Avenues

2.2 Future Without Project Conditions

Without the project, the urban area in and around downtown Morgan Hill will be susceptible to flood damage. The concerns include damage to residential and commercial property, traffic delays, and utility damage. If nothing is done to reduce flood damage, there will be many consequences to the people of Morgan Hill in immediate contact with Llagas Creek Reach 8.

3.0 PLAN FORMULATION

During a study, six planning steps that are set forth in the U.S. Water Resource Council's Principles and Guidelines (P&G) are repeated to focus the planning effort and eventually to select and recommend a plan for authorization. The six planning steps are: 1) specify problems and opportunities, 2) inventory and forecast conditions, 3) formulate alternative plans, 4) evaluate effects of alternative plans, 5) compare alternative plans, and 6) select recommended plan. The iterations of the planning steps typically differ in the emphasis that is placed on each of the steps. In the early iterations, those conducted during the reconnaissance phase, the step of specifying problems and opportunities is emphasized. That is not to say, however, that the other steps are ignored since the initial screening of preliminary plans that results from the other steps is very important to the scoping of the follow-on feasibility phase studies. The sub-paragraphs that follow present the results of the initial iterations of the planning steps that were conducted during the reconnaissance phase.

3.1 Planning Process

Due to the Santa Clara Valley Water District's previous work in the project area, they played an active role in the design of this report. In addition to the District's input, the U.S. Fish and Wildlife Services, the National Marine Fisheries Service, and the California Department of Fish and Game, was consulted in a meeting with the Corps, Santa Clara Valley Water District, and a representative of the City of Morgan Hill to ensure that the proposed designs did not violate any laws or environmental constraints.

3.2 National Objectives

1) The national or Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the nation's environment, pursuant to national environmental statures, applicable executive orders, and other Federal planning requirements. Contributions to National Economic Development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation.

3.3 Public Concerns:

A number of public concerns have been identified during the course of the reconnaissance study. Initial concerns were expressed in the study authorization. Additional input was received through coordination with the Sponsor and some initial coordination with other agencies. The public concerns that are related to the establishment of planning objectives and planning constraints are:

1) Flooding of nearby residences and businesses

2) Loss of creek's aesthetic and general habitat qualities

3) Use of concrete structures in and around area of creek

4) Alternatives are developed that are not acceptable to the local residents and concerned public

3.4 Problems and Opportunities: The evaluation of public concerns often reflects a range of needs, which are perceived by the public. This section describes these needs in the context of problems and opportunities that can be addressed through water and related land resource management. For each problem and opportunity, the existing conditions and the expected future conditions are described, as follows:

1) Problem: During severe winter storms the excess water causes the creek to overflow and flood surrounding businesses and residences. Without flood control protection, the areas around the creek will suffer major physical as well as financial losses.

2) Opportunity: There exists an opportunity to stabilize the streambank to protect against a 100 year or 1% flood.

Comment: We probably also want to recognize that delivery there may still be some local flooding in certain events due to the storm drainage system, regardless of the capacity of the channel.

3.5 Planning Objectives: The national objectives of National Economic Development are general statements and not specific enough for direct use in plan formulation. The water and related land resource problems and opportunities identified in this study are stated as specific planning objectives to provide focus for the formulation of alternatives. These planning objectives reflect the problems and opportunities and represent desired positive changes in the without project conditions. The planning objectives are specified as follows:

1) Reduce damages associated with flooding along Llagas Creek to residential properties, utilities, and public roadways.

2) To increase residential and commercial opportunities by providing a stable thoroughfare for vehicles to businesses and surrounding homes.

3) To stabilize the stream bank by reducing the erosion rate to a negligible level. This stabilization should protect the entire 1.9 mile section of the reach and

reduce the chance of flooding to a level where Llagas Creek will remain in its present condition for the next 50 years.

Comment: Do they really want to say this? They should recognize that flood protection is a dynamic process involving long term maintenance, even of constructed channels.

Also, does this mean that the project design life is 50 years?

3.6 Planning Constraints: Unlike planning objectives that represent desired positive changes, planning constraints represent restrictions that should not be violated. The planning constraints identified in this study are as follows:

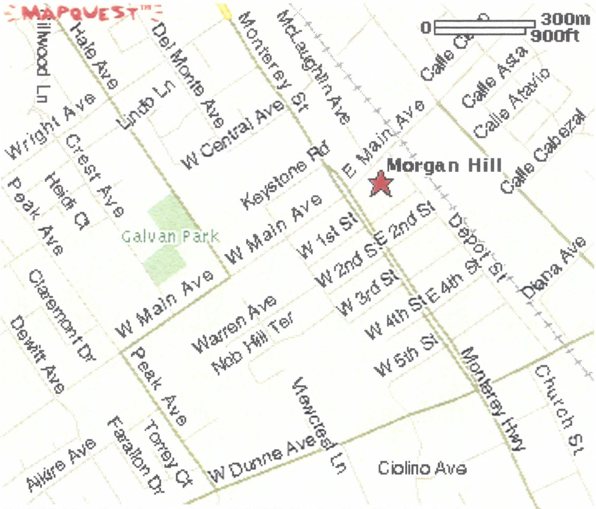
1) Compliance with the National Environmental Protection Act (NEPA), California Environmental Quality Act (CEQA), California and Federal Endangered Species Act processes, as well as the California Department of Fish and Game and the Central Coast Regional Water Quality Control Board Permitting Processes.

Deleted: and

2). There is a very narrow right of way due to nearby residences and businesses.

3.7 Measures to Address Identified Planning Objectives. A management measure is a feature or activity at a site that addresses one or more of the planning objectives. A wide variety of measures were considered, some of which were found to be infeasible due to technical, economic, or environmental constraints. Each measure was assessed and a determination made regarding whether it should be retained in the formulation of alternative plans. The descriptions and results of the evaluations of the measures considered in this study are presented below:

1) The use of vegetative gabions for use of creek lining to both protect the stream bank from the 100-year flood as well as encompass the aesthetic qualities the residents request.
2) Bypass Channel
3) Reinforced Concrete Box



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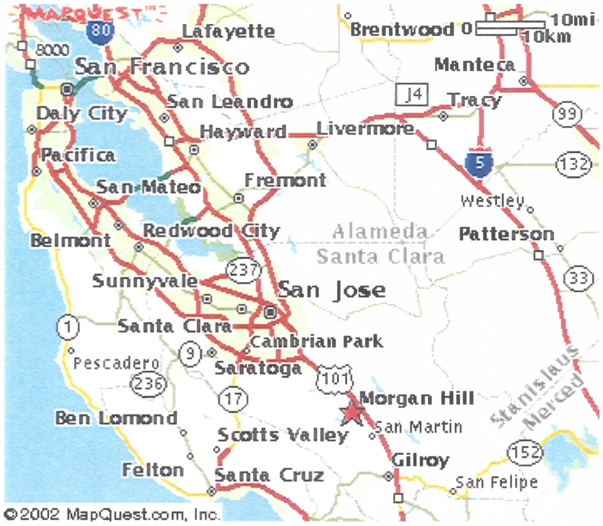
Project Vicinity



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Project Location: The study area is located in the downtown area of Morgan Hill.

3.8 Alternative Plans for Reach 8 –

The Santa Clara Valley Water District developed three conceptual plans for Reach 8. The development of these plans was dependent on the acceptance of the residents and business owners near the creek that are constantly troubled by flooding during a rainy season in Morgan Hill.

The alternatives presented to the regulatory agencies as well as to business owners and residents of Morgan Hill. The four alternatives are: Vegetated Gabions, Bypass Channel, a Reinforced Concrete Box, and a Hybrid plan.

Deleted: Vegetative

Vegetated Gabions – Gabion lining along existing creek alignment. The baskets will include soil layers for plantings.

Deleted: Vegetative

Comment: We will need to discuss further the exact configuration of this feature. It is unlikely that we will be able to obtain fully vegetated gabions with the very steep slopes that are needed.

Bypass Channel – A bypass channel would be installed in the street right of way. The existing channel would remain undisturbed.

Reinforced Concrete Box - Underground culvert along existing channel alignment. Areas used as bike & pedestrian trails, with plantings along trail.

Hybrid – Vegetative Gabions throughout most of Reach 8 with the exception of the stretch along Hale Avenue that will be protected by a reinforced concrete channel. Protecting with the reinforced concrete channel will allow for the future expansion of the St. Theresa Expressway, developed by the City of Morgan Hill.

4.0 PLAN COMPARISON

4.1 Associated Evaluation Criteria. During plan evaluation, four specified criteria were applied to the alternative plans. These criteria are defined in the following paragraphs.

a. Acceptability. The acceptability of the plan determined through evaluating its acceptance by the concerned public. A plan is acceptable if it is, or would likely be, supported by a significant segment of the public. The hybrid plan that includes the culvert for a section of the reach and gabions for the rest is the alternative that yields the greatest acceptance by the public.

b. Completeness. Plan completeness is determined by analyzing whether all necessary investments or other actions necessary to attain the full plan have been included. Each alternative is complete.

Comment: I'm not sure we've done adequate investigation to determine that the gabions will support successful vegetation. More likely, the vegetation will be at or near top of bank.

c. Effectiveness. Plan effectiveness is determined by analyzing how well each plan satisfies the planning objectives. The planning objectives identified for this study were to reduce further damage created by flooding. Each of the plans could be effective in reducing flood damages along Llagas Creek and provide flood protection for the 1% event (100-year flood event). Due to the similarities in the plans no difference in performance is apparent.

d. Efficiency. The efficiency of a plan is its availability to achieve the planning objective in a manner that produces outputs in the least costly manner. The hybrid plan has been accepted for this issue.

4..2 Roster of Project Delivery Team-

Project Manager: David Patterson
Project Planner: Katherine Reyes
Environmental Manager: Christopher Eng
Water Resources Engineer: Terry Marks
Geotechnical Engineer: Paul Hecht
Civil Engineer: Ricardo Galdamez
Cost Engineer: Jeffery Ide
Economist: Timi Shimabukuro

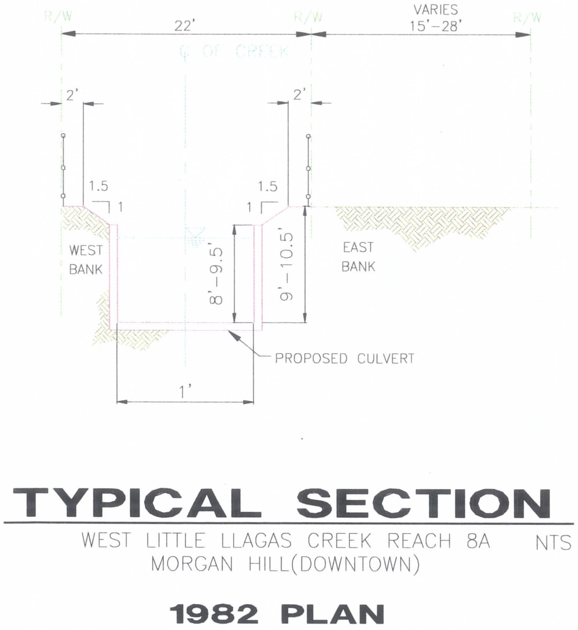
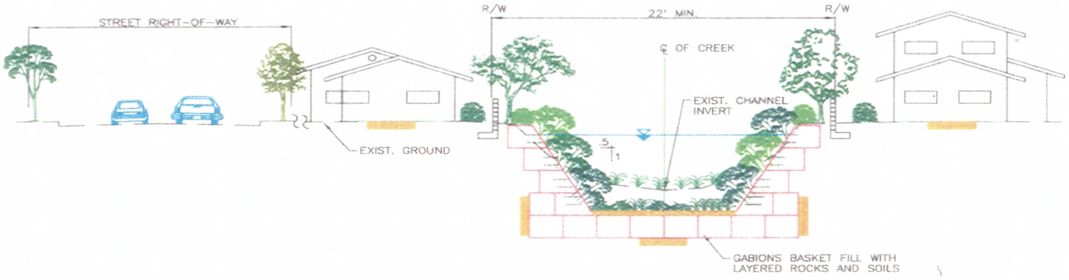


Figure 4-1 – 1982 NRCS Design

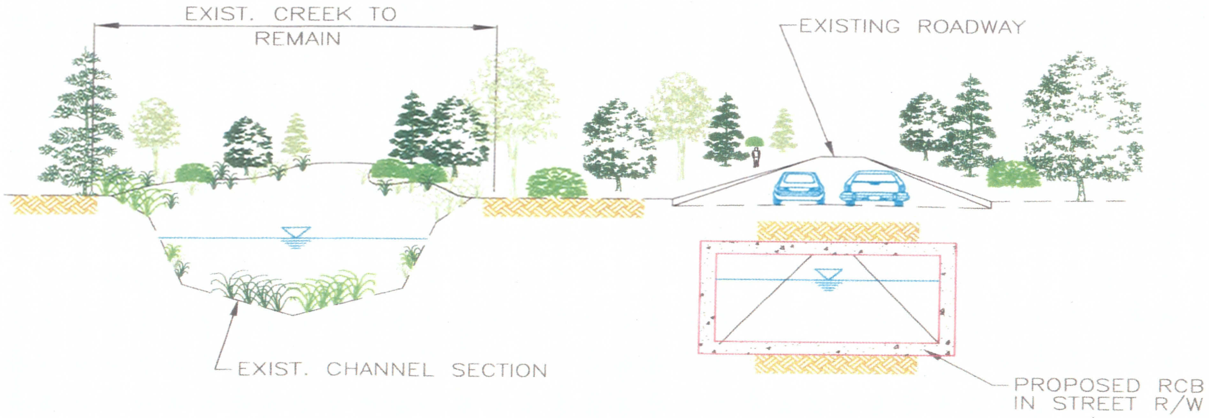


TYPICAL SECTION

LLAGAS CREEK – MORGAN HILL(Downtown) NTS

OPTION 1 – GABION ROCK LINING

Figure 4-2 – Cross section of Gabion Rock Lining alternative.



TYPICAL SECTION

LLAGAS CREEK – MORGAN HILL(Downtown) NTS

OPTION 2 – CONCRETE CULVERT IN STREET R/W AND EXISTING CHANNEL TO REMAIN

Figure 4-3 – Cross Section of Bypass Alternative

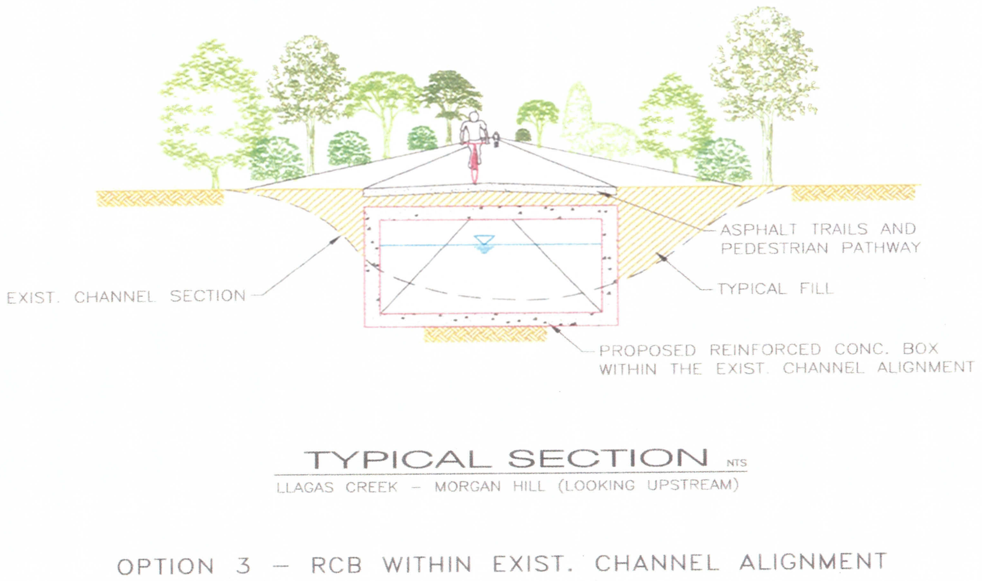

ASPHALT TRAILS AND PEDESTRIAN PATHWAY
TYPICAL FILL
EXIST. CHANNEL SECTION
PROPOSED REINFORCED CONC. BOX WITHIN THE EXIST. CHANNEL ALIGNMENT
TYPICAL SECTION NTS
LLAGAS CREEK – MORGAN HILL (LOOKING UPSTREAM)
OPTION 3 – RCB WITHIN EXIST. CHANNEL ALIGNMENT

Figure 4-4 - Cross section of Reinforced Concrete Box Alternative to be used on the St. Theresa Expressway

5.0 The Selected Plan –

5.1 General The selected plan is a combination of two measures. The vegetated gabion alternative for most of the project and the reinforced concrete box were determined to be satisfactory to the public and all parties involved. The reinforced concrete box will be used in the straightaway along Hale Avenue for the St. Therese Highway to later be constructed by the City of Morgan Hill.

Deleted: vegetative

Comment: I know that there are practical reasons for this alternative, but it will be difficult to sell to the reg agencies, even for this creek where we are intentionally excluding fish.

It will be difficult to maintain, so we should have the maintenance folks look at this too.

5.2 Plan Description

a. Reach 8 – West Little Llagas Creek, Downtown Morgan Hill

Reach 8 is the most urbanized reach within the project limit. Reach 8 is located on West Little Llagas Creek in downtown Morgan Hill, between West Dunne Avenue to the project limits, approximately 800 feet upstream of Wright Avenue. Reach 8 is a highly urbanized creek area, with a seasonal occurrence of runoff, except in a few locations of perennial water due to urban runoff. Along the length of the creek in Reach 8 several homes or other buildings have been built next to the top of channel bank. The existing creek in Reach 8 consists of a trapezoidal earthen channel, with a top width of approximately 20 feet and an average depth of 4 feet. The existing channel capacity is approximately 300 cfs, less than the 10-year event. The creek passes though seven (7) culverts, all of which are undersized.

b. Reach 8 Alignment

West Little Llagas Creek, through Reach 8, is 1.15 miles in length. In general the existing channel alignment has been maintained, except in two locations where the channel will be relocated.

As part of the City of Morgan Hill's Master Plan, Hale Avenue will become an extension of the future Santa Teresa Expressway expansion and will be widened considerably. Between the upstream end of the project and Wright Avenue, the channel will be moved approximately 60 feet west of it's present location to the existing SCVWD 100 ft right-of-way. The new alignment will tie into the existing channel at Hillwood Lane.

Between Del Monte Avenue and Warren Avenue, the existing creek is located very closely to two houses at Del Monte Avenue. The current property owner requested that creek be moved as far to the right (looking downstream) as possible, to avoid segmenting his properties.

The existing and proposed channel alignments for Reach 8 are shown on Plates 5.1.

c. Reach 8 Hydrology

The improvements to West Little Llagas Creek in Reach 8 are designed to provide protection from the 1% flood event or the 100-yr flood. The peak flows and design flows throughout Reach 8 are shown in Table 5.1. For comparison, the NRCS 1% & 10% flows are also included in Table 5.1. It can be seen from Table 5.1 that the peak flows in Reach 8 have increased slightly from the NRCS design peak flows.

Table 5.1
West Little Llagas Creek
Reach 8 Peak Flow Rates

Location	Drainage Area (sq. mi)	50% Peak (cfs)		10% Peak (cfs)		1% Peak (cfs)	
		USACE	NRCS	USACE	NRCS	**USACE Design Q**	NRCS Design Q
Upstream Wright Ave	1.53	185	-	400	400	**650**	620
Downstream Main Ave	1.99	270	-	535	520	**840**	810
Downstream W. 5th Ave	2.35	315	-	630	610	**990**	950
Downstream Ciolino Ave (u/s Dewitt Ck)	2.61	350	-	700	690	**1100**	1050

d. Reach 8 Hydraulic Design

The design objective for this reach is to improve the aesthetic quality and amenity value of the creek within an urbanized watershed and increase the level of flood protection to provide protection from the 100-year flood. HEC-RAS was used to determine the water surface profiles for subcritical flow, the water surface profile for Reach 8 is shown on Plates 5.1.

Due to the urbanized nature of West Little Llagas Creek between West Dunne Avenue and Main Avenue and the limited available right-of-way, no maintenance access roads are included in the design. Channel maintenance access is along the channel bottom by lowering equipment into the channel. The proposed channel consists of 3092 feet (0.59 miles) of a trapezoidal vegetated gabion channel, with a geogrid low flow channel invert. The geogrid lining will allow for some vegetation, mostly grasses to grow along the invert of the channel, while providing a stable channel bottom for maintenance equipment The proposed trapezoidal cross section has a 20-foot bottom width, 1V:0.5H side slopes and a varying depth of 7.5 to 10-feet and a maximum top width of 30 feet. The design assumes a Manning n-value of 0.04. The average channel velocities in this section of Reach 8 are 5.4 feet per second. The channel-forming discharge channel was not included in this section of Reach 8 due to lack of available right-of-way.

In contrast to the proposed design between West Dunne and Main Avenue, the NRCS design, through downtown Morgan Hill, a 14-foot wide concrete rectangular channel, minimized excavation and the necessary right-of-way, by designing the channel to flow under supercritical conditions.

Between W. Dunne and Main Avenue, there are five creek crossings at; W. Fifth, W. Fourth, W. Third, Del Monte Avenue and Warren Avenue. The existing culverts are undersized and are not capable of conveying the 1% flood event. Therefore, all the culverts need to be replaced. The existing culvert and design culvert information are included in Table 5.2.

As part of the future Santa Teresa Expressway expansion between Main Avenue and Wright Avenue, the existing creek would be replaced with two (2) – 10 wide x 7-ft of 8-ft, high reinforced concrete box (RCB) culverts under the expressway. A Manning n-value of 0.015 was assumed in this section of Reach 8. The total length of the RCB will be approximately 2200 ft (0.42 miles) and will follow the existing alignment on the left side of Hale Avenue, looking downstream. The culvert is designed to flow under open channel, subcritical conditions with maximum and minimum velocities of 9.8 and 5.4 feet per second, respectively, with an average velocity of 7.6 feet per second.

The Santa Teresa Expressway expansion also affects the most upstream section of Reach 8, between Wright Avenue and the end of project, downstream of Hillwood Lane. The existing channel will be moved approximately 60 feet west of its present location to the existing SCVWD right-of-way. . The proposed channel consists of approximately 600 feet (0.11 miles) of a trapezoidal channel. The proposed cross section consists of a trapezoid channel, with a 20-foot bottom width, 1V:3H side slopes and a depth of 8-feet and a top width of 70 feet. The design assumes a Manning n-value of 0.07. The average channel velocities in this section of Reach 8 are 2.8 feet per second. Maintenance access would be along the top of bank. The new alignment will tie into the ultimate design channel invert at Hillwood Lane. Hillwood Lane consists of an arched bridge, with an ultimate design invert of 344.78 ft (NAVD 88). The existing invert at Hillwood Avenue is 349.38.

Table 5.2
Reach 8 - West Little Llagas Creek
Proposed and Existing Channel Crossings

Reach 8 Location	**Proposed Design**			**Existing**		
	Roadway Width (ft)	**Culvert Size w (ft) x h (ft)**	**Type of X-ing**	**Roadway Width (ft)**	**Culvert Size w (ft) x h (ft)**	**Type of X-ing**
5th Street	60	2 – 10 x 9	RCB	60	5 x 5	Culvert
4th Street/ Monterey Hwy	270	2 – 10 x 9	RCB	270	9 x 6	Culvert
3rd Street	14	2 – 10 x 9	RCB	14	14 x 7	Culvert
2nd Street/ Del Monte Avenue	250	2 – 10 x 9	RCB	250	10 x 5	Culvert

Warren Avenue	40	2 – 10 x 9	RCB	40	10 x 5	Culvert
Main to Wright along Hale Ave (Future Santa Teresa Expwy)	2200	2 – 10 x 8	RCB	N/a	-	-
Main Street	N/a	-	-	70	9 x 5	Culvert
Wright/Hale Avenue	N/a	-	-	110	60"	RCP

The SVCWD freeboard requirements, Policy 3-218, dated September 16, 1995, requires that where the design water surface elevation is below natural ground, a minimum of one foot of freeboard or two-tenths of the total energy, which ever is greater, shall be used as the minimum freeboard requirement. The minimum freeboard necessary for Reach 8 varies from 1.0 – 1.8 feet. West Little Llagas Creek in Reach 8 has that capacity to carry the 1% design flow, however, Reach 8 does not have the ability to convey the channel capacity plus freeboard in several locations. Therefore, floodwalls will be necessary at several locations in Reach 8 to provide the required amount of freeboard. The freeboard requirements for Reach 8 are shown in Table 5.2.

Any design elements are included in the U.S. Army Corps of Engineers Upper Llagas Creek Flood Control Project Morgan Hill, CA Sediment Assessment and Hydraulic Design Draft Office Report. The channel design summary table and various calculations for the proposed design are included in Appendix A. The HEC-RAS summary output and cross-section plots for West Little Llagas Creek are included in Appendix B.

5.3 Project Impacts The environmental impacts are discussed in the Environmental Impact Statement. During construction the area surrounding the site will suffer several temporary impacts.

Deleted: minor and

Access may be limited or removed for short periods during the construction. Every effort will be made to avoid this situation, and to limit any closures to a short a period as possible.

Traffic will be affected since the construction of the project will require some use of roadways surrounding the study area. During the day this access may be closed for short periods of time during certain construction operations.

5.4 Real Estate Requirements The Real Estate requirements are underway and are in the process of being completed following further studies of the area. Lands that are not included in the right of way will need to be acquired. Real estate mapping is important as the project is it may affect the timeline for the sponsor to acquire lands and future construction dates. Additional information will be amended at a future date.

Deleted: Estate

5.5 Design and Construction Considerations. The design had to be publicly acceptable and the design was altered to accommodate for the future expansion of the St. Theresa

Expressway along Hale Avenue in the Northern section of the reach. There are also 7 culverts that the creek must pass through, which constrict the flow and if are not kept clean lose capacity. Maintenance is a major issue for these culverts. There may be problems with the houses and businesses located so close to the creek.

5.6 Operation, Maintenance, Repair, Replacement and Rehabilitation Requirements.
Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of the flood protection project is the non-Federal sponsor's responsibility, in accordance with provisions contained in the Water Resources Development Act of 1999.

Basis for the Cost Estimate – The current DRAFT estimate for Reach 8 is approximately $27.8 million. This cost is inclusive of a combined channel configuration of Trapezoidal Gabions (2,183 ft length) and RC-Stone Lined channel (1,306 ft length), plus other features. This estimate is for construction only. It does not include real estate numbers, PED, E&D nor S&A $ numbers.

6.0 PLAN IMPLEMENTATION

6.1 General The selected plan (Hybrid Vegetated Gabions and Reinforced Concrete Box) for Reach 8 will be implemented, subject to the alternatives analysis of the EIS/R. Upon approval of the General Reevaluation Report that includes Reaches 4, 5, 6, 7, 8 & 14. Funds will be provided (subject to availability) to initiate the preparation of plans and specifications, including necessary surveys and materials investigations, after approval is obtained for the GRR. This would be followed by the preparation of a final project cost estimate by the District Engineer. At that time, a signed Project Cooperation Agreement (PCA) between the Corps of Engineers and the County of Santa Cruz, the non-Federal Sponsor, would be required. Upon execution of the agreement and acquisition of real estate, bids could be invited, and a contract could be awarded for construction. Following completion of construction, the Santa Clara Valley Water District would be responsible for operation and maintenance of the project.

Deleted: Vegetative

6.2 Division of Plan Responsibilities.

Comment: This stuff seems like boilerplate. Was this discussion tailored to the specific authorization of this project?

a. Federal Responsibilities. The Corps would be responsible

(1) Review and approve advance planning, engineering, and design studies.

(2) Review and approve plans

(3) Prepare specifications

(4) Contract and supervise construction.

(5) Conduct periodic inspection of the completed work with non-Federal interests to ensure proper operation and maintenance.

b. Non-Federal Responsibilities.

a. Provide a minimum of thirty-five (35) percent of total project costs, as further specified below:

(1) Provide, during construction, cash contribution equal to five (5) percent of total project costs.

(2) Provide all lands, easements, and rights of way, including suitable borrow and excavated material disposal areas.

(3) Provide, during construction, any additional costs as necessary to make its total contribution equal to minimum of thirty-five (35) percent and maximum of fifty (50) percent of total project costs.

b. Provide all lands, easements, and rights of way, and suitable borrow and excavated material disposal areas and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, and maintenance of the project.

c. Provide all improvements required on lands, easements, and rights of way to enable the proper disposal of excavated material associated with the construction, operation, maintenance, repair, replacement, or rehabilitation of the project.

d. For so long as the project remains authorized, pay 100 percent of costs to operate, maintain, repair, replace, and rehabilitate the completed project or functional portion of the project prescribed by the Federal Government.

Comment: We're going to try to negotiate a longer Corps presence after construction for this project. New federal legislation requires maintenance follow-up.

e. Give the Federal Government a right to enter, at reasonable times and in reasonable manner, upon property that the non-federal sponsor now or hereafter owns or controls for access to the project for the purpose of inspection, and, if necessary after failure to perform by the non-Federal sponsor, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall operate to relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursing any other remedy at law or equity to ensure faithful performance.

f. Hold and save the United States free from all damages arising from the construction operation, maintenance, repair, replacement, rehabilitation of the project and any project related betterment, except for damages due to the faulty or negligence of the United States or its contractors.

g. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management system set forth in the Uniform Administrative Requirements for

Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20.

h. Perform, or cause to be performed, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights of way that the Federal Government determines to be required for the operation, maintenance, repair, replacement, and rehabilitation of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction.

i. Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights of way that the Federal Government determines to be required for the operation, maintenance, repair, replacement, or rehabilitation.

j. As between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability. To the maximum extent practical, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause the liability to arise under CERCLA.

k. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 9-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights of way required for the operation, maintenance, repair, replacement, and rehabilitation of the project, including those necessary for relocations, borrow materials, and excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

l. Comply with all applicable Federal and State laws and regulations including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

m. Provide fifty (50) percent of that portion of total cultural resources preservation, mitigation and data recovery costs attributable to storm damage reduction/shore protection that are in excess of one (1) percent of the total amount authorized to be appropriated for storm damage reduction/shore protection.

o. Prescribe and enforce regulations to prevent obstructions of or encroachments on the project that would reduce the level of protection it affords or that would hinder operation and maintenance of the project.

p. Not less than once each year, inform affected interests of the extent of the protection afforded by the Project.

q. The non-Federal sponsor shall publicize flood plain information in the area concerned and shall provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.

6.3 Views and Financial Capability of the Sponsor. The local sponsor (Santa Clara Valley Water District) is willing to support the hybrid (Gabion and Reinforced Concrete Box) plan. The District has been informed of local cost-sharing requirements associated with flood damage control projects and will furnish a letter of participation. An ability to pay analysis indicates that the project is not eligible for any reduction in the non-Federal cost sharing requirements.

Comment: With reservations listed above

A review of the criteria used by credit rating agencies and by the District for evaluating a community's financial capability, indicates that the Santa Clara Valley Water District "Water District" has the ability and willingness to meet its obligations as the non-federal sponsor of the Llagas Creek Flood Damage Reduction Project.

Created by an act of the California Legislature, the Water District operates as a state of California Special District, with jurisdiction throughout Santa Clara County, one of the wealthiest and fastest growing counties in the nation. Funding for district operations comes from a number of sources, including revenue from the sale of water to 13 municipalities and water retailers, property taxes, bonds, benefit assessments and state and local revenues.

The Water District's financial position remains excellent, receiving bond ratings of AA from Standard and Poor's and Aa3 from Moody's. With its rapidly growing tax base and a low debt position, the County has also proven its ability to operate balanced budgets and maintain healthy surpluses over the past several years. Finally, the Water District has successfully cooperated with the Corps of Engineers on past Corps studies and projects, (e.g., Upper Guadalupe River, Coyote Creek) and has met all of its obligations with regard to cost sharing the present feasibility study. Successful participation in these and other projects demonstrates the Water District's good faith effort to meet its financial obligations in its partnership with the Corps of Engineers.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions.

- The history of flood damages will cause problematic situations for numerous residents and business owners in Morgan Hill. (Reach 8 Llagas Creek).

- The Selected Plan is a Gabion Lined Channel and a Reinforced Concrete Box. The sponsor and the public prefer the aesthetic qualities of this plan and it meets the Corps objectives.

- The selected plan will prevent further flooding and fully meets the Federal and non-Federal sponsor's flood damage reduction objectives.

7.2 Recommendations Prevention of further flood damage and the subsequent loss of homes and businesses are justified at this time. Based upon consideration of the environmental, social, economic impact, and the engineering specialties, in addition to assistance from the sponsor and regulatory agencies, it is recommended that the Gabion Lined Channel and a Reinforced Concrete Box be the plan implemented for Reach 8 of Llagas Creek as a Federal Project.

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